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ASSOCIATION VALUE AND SUBJECTIVE RATINGS OF INTEREST IN VISUAL COMPLEXITY.

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THIS STUDY INVESTIGATED THE RELATIONSHIP BETWEEN THE ASSOCIATION VALUE AND SUBJECTIVE RATINGS OF INTEREST IN NOVEL AND FAMILIAR RANDOM POLYGONS OF THREE LEVELS OF COMPLEXITY. SIGNIFICANT INTERACTIONS WERE OBTAINED BETWEEN THESE VARIABLES AT EACH LEVEL OF COMPLEXITY. THE RESULTS OF THE STUDY WERE INTERPRETED ACCORDING TO CURRENT MOTIVATIONAL THEORY, AND RELATED TO EFFORTS TO MEASURE CURIOSITY. THIS PAPER WAS PRESENTED AT THE AMERICAN EDUCATIONAL RESEARCH ASSOCIATION CONVENTION, CHICAGO, ILLINOIS, FEBRUARY 9, 1968. (AUTHOR)

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Association Value and Subjective Ratings of Interest in Visual Complexity

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ABSTRACT

This study investigated the relationship between the association value and subjective ratings of interest in novel and familiar random polygons of three levels of complexity. Significant interactions were obtained between these variables at each level of complexity. The results of the study were interpreted according to current motivational theory, and related to efforts to measure curiosity.

Day (1966) has defined specific curiosity as interest in complex stimulation and has attempted to develop a "Test of Specific Curiosity" (TSC). This test currently consists of 28 2" x 2" slides of figures, varying along a dimension of complexity, developed by Berlyne (1963). Subjects are asked to rate each figure on a seven point scale of interestingness. A TSC score is derived from these data.

More recently, Day (1967) has been investigating various variables which affect subjective ratings of interest in a set of random polygons varying in number of sides from 4 to 160 sides. These random polygons are derived according to the rules outlined by Attneave and Arnoult (1956), and it is anticipated that random polygons varying in complexity will at some future time form the stimuli in the TSC. As with nonsense syllables, (Glaze, 1928; Hull, 1933; Witmer, 1935) random figures have been shown to have association values (Vanderplas and Garvin, 1959; Munsinger and Kessen, 1964; Clark, 1965). This initial study was designed to investigate the relationship between association value and subjective ratings of interest in a set of random figures of low, medium, and high levels of complexity.

Vanderplas and Garvin (1959) studied association values of 30 of each of six levels of complexity (4, 6, 8, 12, 16, and 24 sides). Their subjects were shown each of the 180 figures for 3 seconds and were asked to give an association to each, or if they felt the figure looked like something, but could not name it, they were asked to say yes. This latter procedure seems rather dubious, because if a subject is unable to name the association, it

is questionable whether such an association is very strong or really exists. Analysis of the data of Vanderplas and Garvin (1959) indicates that the order of the figures according to association value and yes responses varies considerably from the order of the figures according to association value alone.

Hull (1933) maintains that association values for material, such as nonsense syllables and random shapes, should be determined under the same conditions under which this variable is to be manipulated in a memory experiment or other task. On the basis of this observation the findings of Vanderplas and Garvin (1959) cannot be utilized in the study of interest in complexity, under the terms of reference used by Day (1966), for two reasons. First, Vanderplas and Garvin (1959) exposed their figures for only 3", whereas in Day's (1966) study the figures were shown for 8". Secondly, Vanderplas and Garvin (1959) studied figures varying in number of sides from 4-24 sides, which is the low complex material used by Day (1966).

Munsinger and Kessen (1964) studied the meaningfulness of random shapes. They instructed their subjects as follows: "Tell me which shape reminds you of more things; that is, which shape is more meaningful." The study involved 48 subjects, who were asked as indicated above to judge the more meaningful of two stimuli presented simultaneously. It should be noted that no actual associations were called for. The subjects viewed pairs of figures which varied in number of sides from 5-40 sides, for ten seconds each pair. There would appear to be three major problems with this design; a) no actual associations were called for, b) subjects had to name

one of the figures more meaningful, and c) only three figures were used at each complexity level. In contrast to Vanderplas and Garvin (1959), Munsinger and Kessen (1964) found that the more complex material yielded higher meaningfulness scores than the low complex material. Munsinger and Kessen (1964) assume that subjects show greater preference for meaningful material.

As suggested by Hull (1933) it was decided to expose the figures under the same conditions as in the TSC. The subjects were asked to give specific associations, i.e., a word or a phrase, to each figure if they could. Finally, in order to sample both the low and the high complexity material, 10, 28, and 80 sided figures were constructed for use in this preliminary study.

METHOD

Apparatus

The stimuli were 75 random shapes, 25 at each of three levels of complexity, 10, 28 and 80 sides. Each shape was constructed by method 1, of a series of methods suggested by Attneave and Arnoult (1956) for the construction of random shapes. Each figure was photographed (black on white) and 2" x 2" positive slides were made of each shape.

Each slide was numbered consecutively such that the first 10 sided figure was number 1, the first 28 sided figure was number 26, and the first 80 sided figure was number 51. The slides were then ordered at random as

their number appeared in a table of random numbers, and placed in a Kodak "Carousel" slide tray. The slides were projected on a 48" x 48" screen from a Kodak "Carousel" 800 automatic projector.

Subjects

a) Group I (AI): This group included 32 subjects from Ryerson Polytechnical Institute. There were 10 males and 22 females who ranged in age from 19 to 44, with a median age of 22. Six subjects were enrolled in nursing science and 26 in welfare sciences. They were tested during a joint Sociology class. This group was asked to give associations first and rate how interesting the figures were second.

b) Group II(IA): This group included a further 32 subjects from Ryerson Polytechnical Institute. There were 20 males and 12 females, who ranged in age from 19 to 37, with a median age of 21. All subjects were in the business administration course and were tested during a Sociology class. This group was asked to give interest ratings first and associations to the figures second.

Procedure

a) Association Task: Subjects were handed the response sheets and asked to fill in personal data indicated. Then the instructions were read as follows: "I am going to show you a number of pictures of random shapes. You will see each figure for 15 seconds, during which time I would like

you to record your responses on the sheet you have. Some of the figures or part of them may remind you of some familiar object or situation. Please record in a word or phrase whatever the slide reminds you of on your answer sheet. If a shape does not remind you of anything make a check mark on the sheet in the space provided. You may record as many responses to each slide as you wish. Please use a separate line for each response and remember to record each as briefly as possible in a word or a phrase".

The 75 slides were then shown for 15 seconds each, during which time the subjects wrote their responses. Actual time spent looking at each figure was approximately the same as in the TSC (8 seconds). The remaining 7 seconds were spent recording.

b) Interest Task: After being handed the answer sheets the subjects were asked to supply the personal data indicated. The following instructions were then read:

"You will be shown a series of geometrical figures. Each figure will be displayed on the screen for eight (8) seconds. Please rank each figure somewhere on the seven point scale on your answer sheet such that one (1) represents a figure you consider to be not interesting and seven (7) represents a figure you consider to be extremely interesting. For each figure please circle the number representing how interesting you think it is."

The 75 slides were then shown for 8 seconds, during which time subjects made their responses.

TABLE 1

Analysis of variance of Associations data

Source	df	MS	F
Complexity	2	571.247	11.13*
error (a)	72	51.343	
Task order	1	1,019.206	72.10*
C x T	2	36.207	2.56
error (b)	72	14.137	

*significant beyond the .001 level

RESULTS AND DISCUSSION

Analysis of variance of association data was performed with the main effects being levels of complexity and task order. The results of this analysis are shown in Table 1. Both complexity and task order were

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Insert Table 1 about here

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significant beyond the .001 level of significance, while the interaction effect was not. Figure 1 shows the total number of associations for the 25

Insert Figure 1 about here

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figures at each of the three levels of complexity by the groups. It is evident that more associations were given by the group performing the association task first than by the group which had ratings of interestingness beforehand. The explanation for this change can probably be found in an examination of the development of schema with familiarity. However, time does not permit an extended elaboration of this idea. A second finding is that association values tended to decrease with complexity. This latter finding agrees with that of Vanderplas and Garvin (1959) who found a negative correlation between complexity and association value.

An analysis of variance of interestingness data was performed with

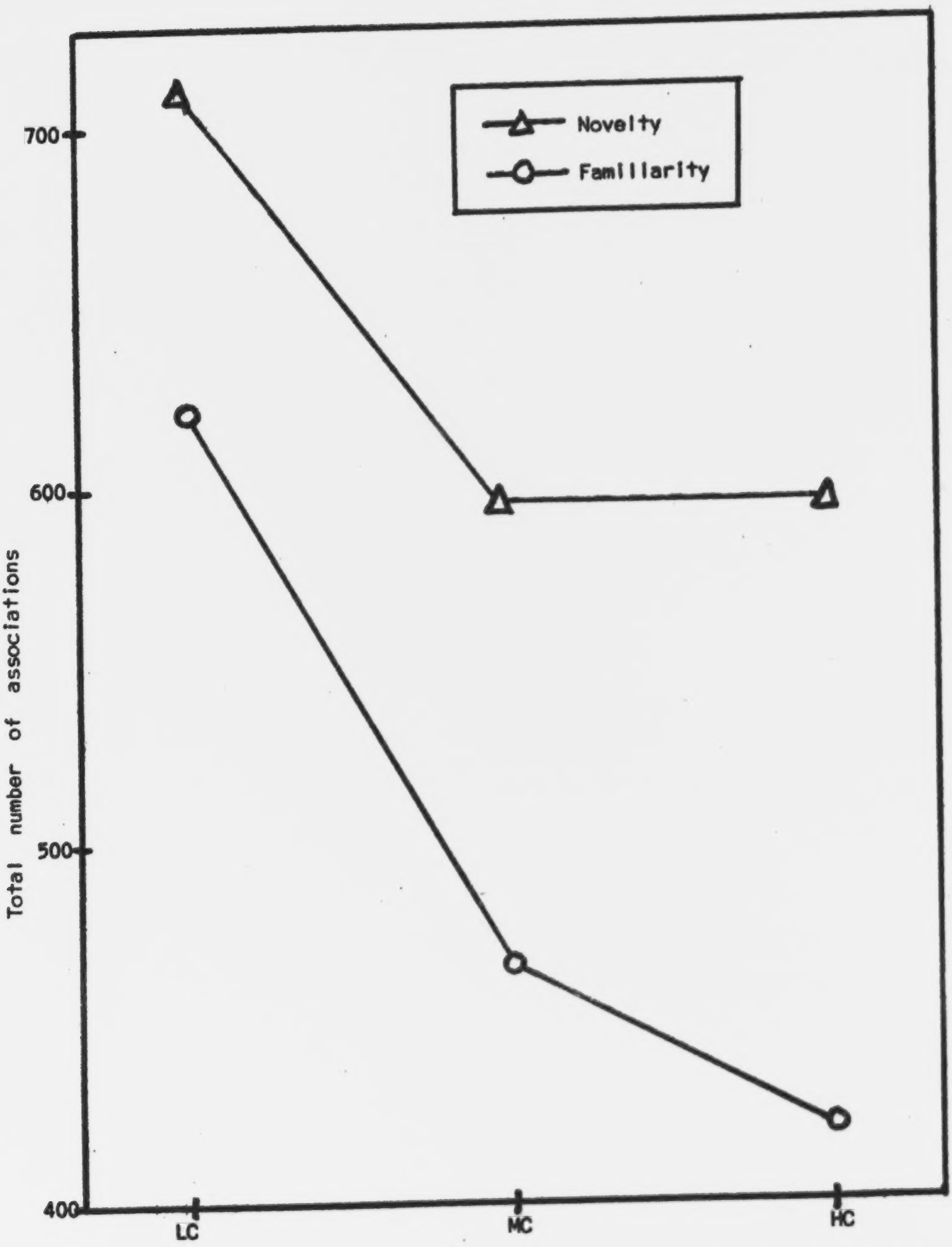

Fig. 1. Number of associations at each level of complexity by IA and AI groups.

the main effects being levels of complexity and task order. The results of this analysis are shown in Table 2. Both main effects, complexity and task

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Insert Table 2 about here

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order and the interaction effect were all significant beyond the .001 level. Mean interest ratings for the 25 shapes at each of the three levels of complexity for the 32 subjects are shown in Figure 2. The interest ratings

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Insert Figure 2 about here

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of subjects performing the interest tasks after the association tasks can be seen to increase almost linearly from the 10 to the 80 sided figures. On the other hand, the interest ratings for those subjects performing this task first, increased from 10 to 28 and then decreased from the 28 to the 80 sided figures. This finding may be explained in terms of the net effect of collative variability. Berlyne (1963) suggested that all forms of collative variability, whether novelty or complexity, ambiguity etc., all contribute to the sum total of collative variability of a stimulus. For subjects performing the interest task first,both novelty and complexity were high. As a result the 80 sided figures may have been beyond the preferred level of collative variability for the subjects. On the other hand, subjects performing this task after they had been exposed to the material once before,

TABLE 2

Analysis of variance of interestingness ratings

Source	df	MS	F
Complexity	2	8,754.667	32.03*
error (a)	72	273.355	
Task order	1	17,002.727	230.08*
C x T	2	8,968.507	121.36*
error (b)	72	73.899	

*significant beyond the .001 level

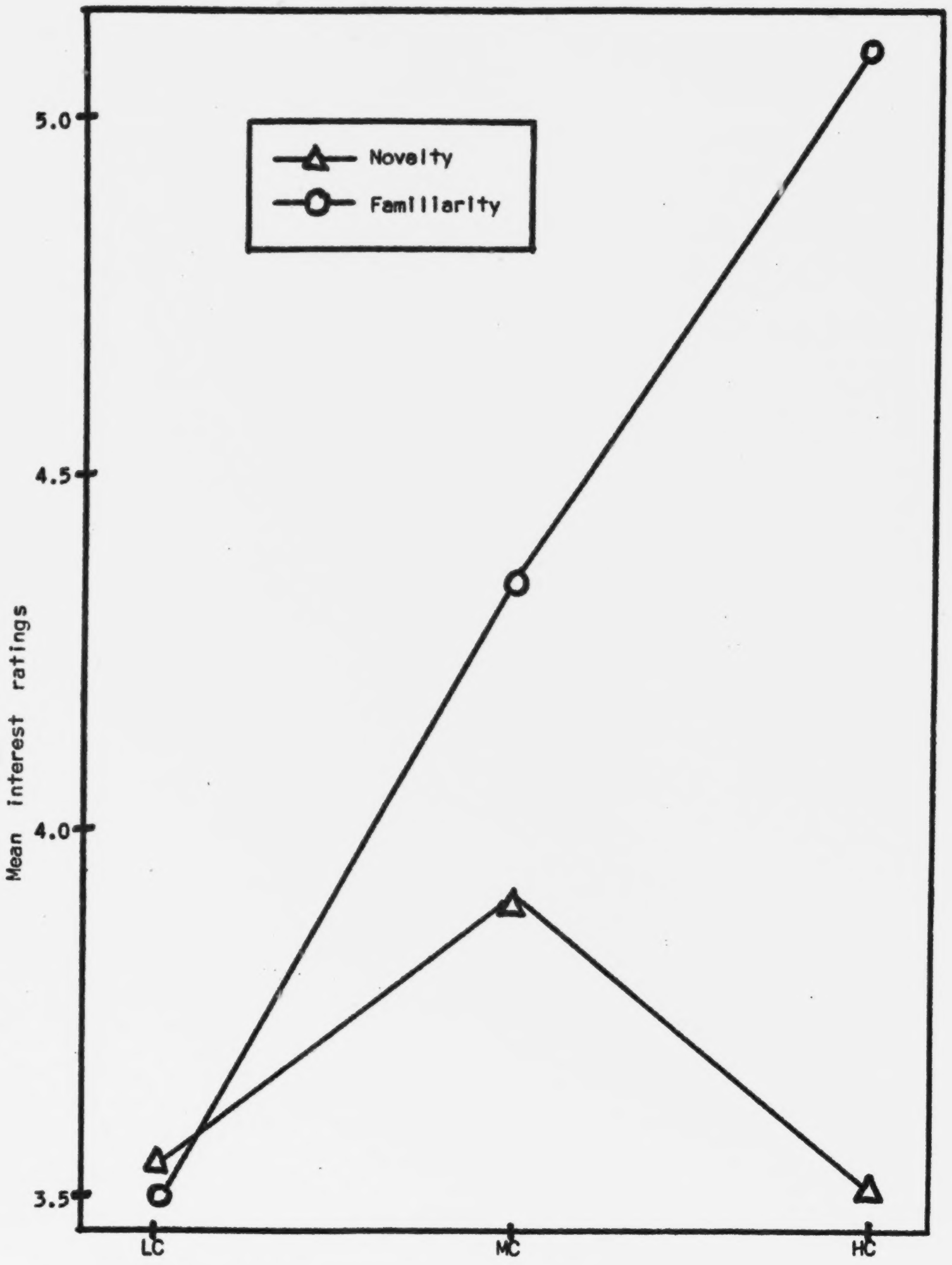

Fig. 2. Mean ratings of interestingness at each level of complexity by IA and AI groups.

were affected only by the complexity element of the collative variability and not by the novelty. Thus this material had a lower level of collative variability and was closer to the preferred levels for the subjects.

Finally, correlations between the sum of interest ratings and the sum of association values collapsed over the 64 subjects, were computed for the 25 slides at each level of complexity. For the ten sided figures, the Pearson r of .35 was obtained (probability greater than .05). Pearson r .62 was obtained for the 28 sided figures and .53 for the 80 sided figures. Both of these latter correlations are significant beyond the .01 level.

These findings suggest that the use of random polygons in any experiment which deals with learning or the measurement of curiosity, must take into account the effects of both the association value of the polygons and their familiarity to the subject in the same way as is now common practice in verbal learning experiments using nonsense syllables.

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